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ON HYDROPHOBIA AND ITS "TREATMENT,"

Especially by the Hot-Air Bath, commonly termed the
Bouisson Remedy.

BY

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ON HYDROPHOBIA AND ITS "TREATMENT:"

Especially by the HOT-AIR BATH, commonly termed the
BOUISSON REMEDY.

HYDROPHOBIA being a disease of which the true pathology was scarcely known until a few years ago, indeed almost until M. Pasteur began his remarkable investigations, has always been regarded by the quack and the impostor as a fair field of enterprise. The authoritative statements employed by such therapeutical pirates to foist their methods and nostrums upon the much-beguiled public commonly include the prominent expression of some popular belief. Amongst such beliefs must be placed the ubiquitous confidence reposed by the laity in the active secretion of sweat as an efficient means in getting rid of the *materies morbi* of acute specific diseases. It is a very widespread notion that if there is such a poison in the body, it can be "sweated out," just as it used to be generally believed (though now only by a particular sect) that the exercise of religious faith would, if energetically resorted to, get rid of a malady. The application of this sweating treatment in the shape of hot baths to the relief of rabies is of very ancient origin; and, under the belief referred to, it has been largely employed and advocated by irresponsible persons of every degree.

The practice of subjecting hydrophobic patients to hot-air baths, however, received support from a French physician of professional repute, Dr. Bouisson. This gentleman seems to have suffered from

symptoms, most of which resembled those of hydrophobia ; but, from the account he gives of his trouble, his diagnosis that he was really suffering from that disease may well be called in question. Acting on the belief that he was so stricken, he entered a hot-air bath with the idea of terminating its existence, but he gradually became calmer, and soon the symptoms totally disappeared. Struck by these circumstances, he strenuously advocated the use of the hot-air bath in hydrophobia, and published cases in which he thought he had successfully combated the disease. He stated that if the patient were placed in the bath on the first day that the symptoms manifested themselves, a cure would be infallibly obtained. If only on the second day, that the cure was possibly uncertain, and that the treatment was hopeless if begun as late as the third day. Since Dr. Bouisson's papers were published, many patients, actually or supposititiously suffering from hydrophobia, or in whom the occurrence of the disease seemed possible, have been treated on this plan. All those patients who have been reported by respectable practitioners to have been suffering from genuine hydrophobia have died, in spite of the Bouisson treatment.

Instances of its employment by such practitioners will be referred to presently. In spite of the failure of this procedure an attempt was made in the recent epidemic of 1885, and subsequently, to secure its trial by the profession. As might be supposed, its adoption is principally urged by those who are, for obvious reasons, opposed to the progress of medical science, the paid antivivisectionist agitators. These persons spread broadcast glowing misrepresentations of the system, and raise, as I have myself seen, many false hopes, and so cause much pain in the minds of the patient and his friends. For instance, one of their agents, a Rev. J. P. Wright, made the assertion that "Eighty cases had been already cured by this method, and only one doubtful case was chronicled." [The *Zoophilist*, January, 1888, p. 152.] It is deeply to be regretted that certain medical practitioners—to wit, Dr. Bell Taylor, of Nottingham, and Dr. Clarke, of Clapham, have coun-

TABLE. I.

(1887-1888)

VIRUS FIXE.

Nº OF EXP.	DAY IND.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	STATE OF SYMPTOMS ON 15. DAY OF BATH
1	5/2								13/2 BATH		+						VERY PARETIC
2	5/2								13/2 BATH		+						MUCH LESS PARESIS THAN NOY
3	7/2								15/2 BATH	16/2 BATH	17/2 BATH						VERY EARLY STAGE. SOME PARESIS. MUCH RIGIDITY
4	7/2								15/2 BATH	16/2 BATH	17/2 BATH						MARKEDLY PARETIC
8	14/2								22/2 BATH	23/2 BATH	24/2 BATH						MARKEDLY PARETIC
9	14/2								22/2 BATH	23/2 BATH	24/2 BATH						COMMENCING PARESIS DULL AND SHAKY
11	26/2								3/3 BATH	4/3 BATH	5/3 BATH						MARKED PARESIS OF HIND LEGS
12	26/2								3/3 BATH	4/3 BATH	5/3 BATH						COMMENCING PARESIS OF HIND LIMBS
13	27/2								3/3 BATH	4/3 BATH	5/3 BATH						MARKED PARESIS OF HIND LIMBS
14	29/2								6/3 BATH	7/3 BATH	8/3 BATH						MARKED PARESIS OF HIND LIMBS
15	29/2								6/3 BATH	7/3 BATH	8/3 BATH						SHAKY AND VICIOUS EARLIEST COMMENCEMENT

tenanced the statements of these people, and advocated the trial of such treatment on man. What the "antivivisectionists" clearly desire is that the profession at large should make a series of experiments on man to see whether this Bouisson treatment is worth going on with or not. Most of us, however, believe that we can more fitly fulfil our duty towards our neighbour by testing new remedies, not upon his body, but upon that of one of the lower animals, and it was with the object of averting such wholesale human "vivisection" that I instituted a series of experiments (that is, carried out the Bouisson treatment) upon lower animals (rabbits) suffering from rabies or hydrophobia. I was careful to carry out this treatment, not only therapeutically, but also prophylactically, but I regret to say that it favoured rather than hindered the course of the disease, death being invariably the result in each case.

The experimental method adopted was as follows. I inoculated by the usual subdural method eleven animals with what M. Pasteur calls the *virus fixe*—that is to say, the pure virus of the disease, which, in the series that I possessed, produced its first symptoms almost invariably upon the eighth day after inoculation, sometimes, but more rarely, as will be seen by Table I. on the ninth day. I also inoculated three rabbits with virus taken from the medulla of rabid dogs of the street, such virus usually producing, as is well known, its first symptom about the sixteenth day, but in certain rarer instances, in the manner of the *virus fixe*, namely, from about the seventh to the ninth day. (See Table II.) These fourteen animals I placed in a hot-air bath, according to Dr. Bouisson's suggestion, directly they showed the first distinct symptoms of the disease. Finally, I inoculated two other animals with the *virus fixe*, and on the third day after inoculation commenced prophylactic treatment with the hot-air bath, as will be seen in Table III. This treatment antedated by two days the onset of the symptoms, and so expedited the fatal result. There is, therefore, no question in my mind but that this measure exerts a very unfavourable therapeutical

influence upon patients suffering from hydrophobia, by diminishing their resistance to the disease.

I will now proceed to describe in detail the method of experimentation, and afterwards will discuss the effect which it appears to have had upon the human patient in those cases where it has been tried in indubitable cases of hydrophobia.

A. Bouisson Treatment of Rabbits.—The rabbit is an animal which is sensitive to the action of heat, and in which, consequently, the effects of the hot air can not only be readily observed but also seen to continue long after the animal has been removed from the bath. Bearing in mind the statements made by the advocates of the system as to the therapeutic advantage to be gained by employing a high temperature in a more or less continuous manner, the rabbit appeared to be an animal which specially lent itself to such a mode of treatment, for by keeping it at a high temperature for some hours and then removing it one was able as a rule to prevent the onset of heat paralysis, and at the same time to obtain the continuance of the effect of the bath, for example, in the elevated body temperature, &c. The bath consisted of a roomy wooden chamber with glass front and window at the back, there being at both ends a suitable aperture, fitted outside with a ledge for the resting of the head of the animal in the fresh air surrounding the box. As the aperture was, of course, considerably larger than the neck of the rabbit, the interspace was blocked by soft cotton wool. My object in keeping the animal's head in the outer air while the body and limbs were subjected to the hot air was to provide against the possibility of its general vitality being depressed by the carbonic acid, &c., which was doubtless present in the heated air of the chamber, the said air being obtained from an iron funnel and pipe (this opening into the bottom of the chamber), heated by a large Bunsen burner. A thermometer passing through the roof of the chamber recorded the temperature. The animal's condition could thus be easily inspected during the treatment, and the exposure of so small a portion

of the body surface as the head, to the cooler air doubtless exerted none but a beneficial effect. In two instances (Experiments 6 and 8, Tables I. and II.) it will be seen that the animals succumbed to heat paralysis. These were cases in which the disease was extremely marked, Experiment 6 being one of those remarkable instances in which the virus from the rabid dog of the streets occasionally evokes the first symptom and causes death within the minimal period, namely, that of *virus fixe*. In these cases I was endeavouring to counteract the obviously more intense action of the malady by more prolonged bathing, but of course the injurious effect of the bath found little resistance in the central nervous system already overwhelmed by the disease, and so produced the fatal result.

TABLE II		1887																					
RUGE DES RUES		RABIES OF THE STREETS VIRUS																					
		STATE OF SYMPTOM																					
Nº OF EXP ^T	DATE KING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	ON DAY OF TREATMENT
5	2/12																	19/12	20/12				VERY EXCITABLE COMMENCING PARESIS
																		19/12	20/12				
																		19/12	20/12				
																		19/12	20/12				
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This leads me now to speak first, of the appearance of the symptoms calling for the treatment by the bath, secondly, of the action of the bath upon the normal and upon the rabid animal.

1. The initial symptoms. As is well-known, in the rabbit rabies is rarely (see Table I., Experiment 15) accompanied by the excitement so usually seen in other animals. Consequently the first symptoms observed in this animal is the paresis of the hind limbs, this occurring

in all cases of rabies, furious or not. When this was distinctly present in the running or jumping movement of the animal it is expressed in Table I. under the term "marked paresis." It constitutes an admirable means of detecting with certainty the onset of the characteristic symptoms of the malady. It will not be out of place to add that in the further progress of the disease the animal becomes more and more paralysed, and that from being apathetic at the commencement, it rapidly becomes unconscious and dies comatose, usually in from three to four days after the appearance of the first symptom. In Table I. it will be seen with what remarkable, indeed mathematical, regularity the symptoms run their course, with a rapidity slightly (as in Table I.) or markedly (as in Table III.) accelerated by the treatment.

1888

VIRUS FIXE		"PURIFIED" VIRUS										HOT AIR DURING INCUB PERIOD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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2. The effect of the bath. (a) On the normal animal. When a healthy rabbit is placed in a hot-air bath which is, to begin with, at the temperature of the room, and rapidly, that is within thirty minutes, raised to $75^{\circ}\text{C.} = 147^{\circ}\text{F.}$, the respirations of the animal steadily but quickly increase in number, the rate of the heart also being accelerated, and the temperature of the body rising to a variable height, usually one half or more degrees Centigrade. Occasionally, however, the rise in the number of respirations is preceded by a slight fall. The elevation of the temperature and acceleration of the heart and respiratory

rhythm are maintained for some hours after the animal is removed from the bath, and gradually return to normal. (b) On the rabid animal. The diseased rabbit when placed in the hot chamber exhibits the same series of phenomena, but, as might be expected, in a more violent, that is, exaggerated, manner, and this in proportion as the disease has exerted its destructive influence upon the nerve centres. Thus, in Experiment 2 (see Table IV.), on the third day of treatment the rise of temperature of the body (rectal) was most remarkable. The temperature of the animal at the moment of its being placed in the bath was excessively low, it being at the end of the disease, namely, 24.5°C . In two hours and a half it had shot up to 39°C ., that is, a gigantic rise of no less than $14.5^{\circ}\text{C} = 26^{\circ}\text{F}$.

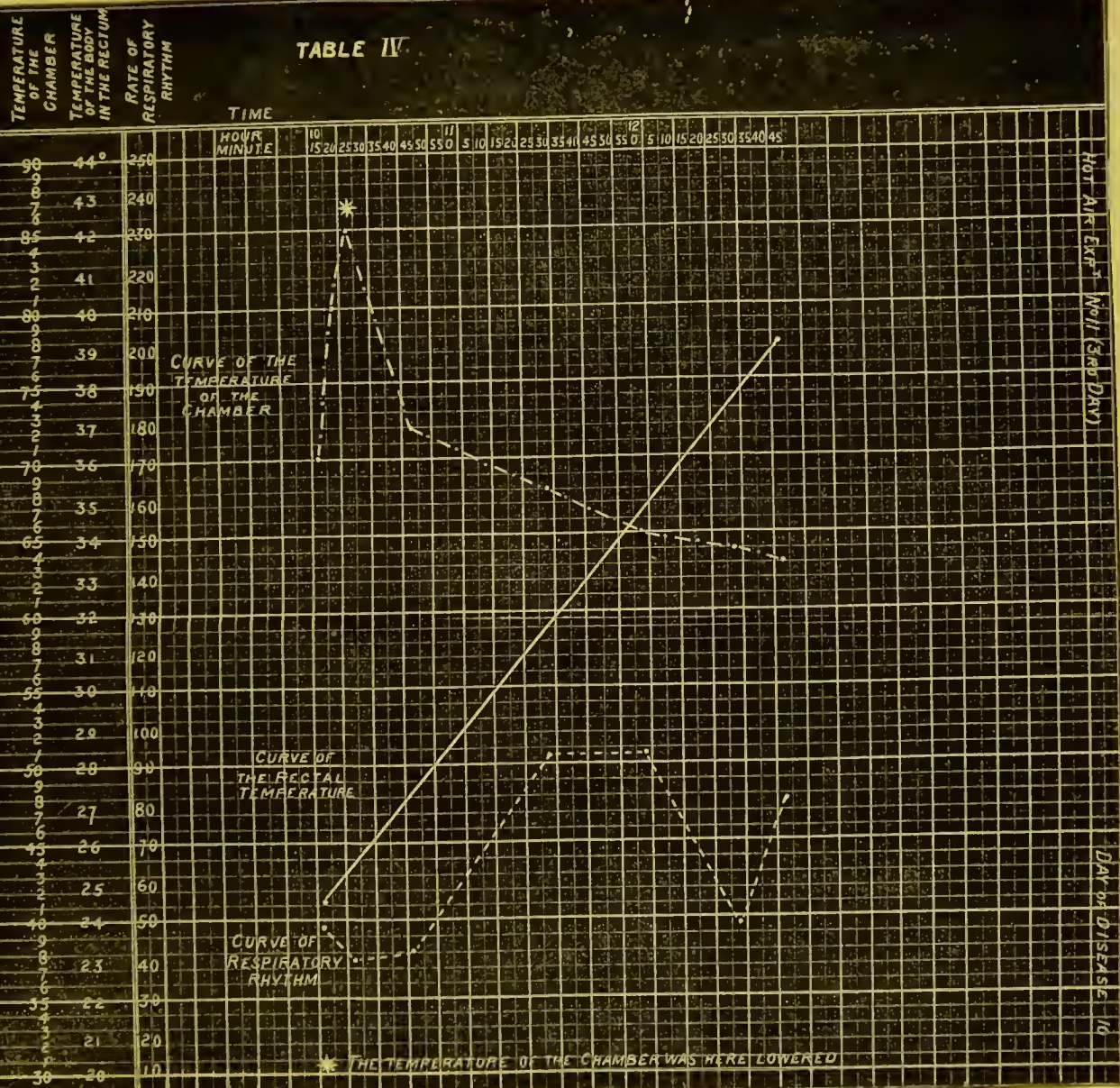
I have 69 charts of the curves, indicating the temperature of the chamber, the rise of the temperature of the body from the beginning to the end of the experiment and the variation in the respiratory rhythm. Analysis, however, of these numerous observations would take me beyond the scope of the present paper, and therefore I will content myself with simply exhibiting the chart, showing these phenomena in the instance just referred to (see Table IV.).

I will now mention the general effect upon the rabic symptoms. These may almost be entirely summed up as being exacerbated. If the animal was taken out before the respiratory acceleration became excessive, it was occasionally noticed that, when previously apathetic, it might be more excitable, but, as a rule, that if the apathy were well marked to start with, the rabbit was rendered more unconscious. In all cases it was much weakened by the heat, and this exhaustion and diminution in the vigour of the animal explains, I believe, the effect of the treatment in man in those cases where it reduced spasm.

The unsteady, shaky gait of the animal was always exaggerated, as also the paralysis.

Apart from the effects described, the usual influence of heat upon secretion was made obvious. Ordinarily there was a free flow of saliva

TABLE IV



and urine, and the intestinal peristalsis was notably increased. The hypothetical excretion of the poison might thus be supposed to have been in full activity, but the only effect upon the animal was sedative—that is, that of further exhaustion.

B. Prophylactic Treatment by the Hot-air Bath.—With a view of giving the treatment a trial before the disease had shown itself, I employed it prophylactically in two cases, as shown in Table III. In each instance the bath was employed as already described, but in each case, also, as shown in the table, the symptoms commenced on the sixth day, that is, two days prematurely, and one animal actually died at the end of the eighth day, instead of, as usual, at the end of the eleventh. The others died at the end of the ninth day. This indicated so unmistakably the general injurious effect on the treatment, that it was unnecessary to pursue the investigation.

I will now give two instances in which the bath has been described to have produced an effect upon the hydrophobic human patient. The only genuine case I am aware of in which distinct “benefit” can be attributed to the bath alone is that reported by Mr. Southam, of Manchester. In Case V. (? Case VI.) *BRITISH MEDICAL JOURNAL*, 1881, p. 815, it is expressly stated that after exposure to the hot air the spasms became much less marked, the patient was much comforted, became drowsy, and ultimately slept for half an hour. This result can but be considered as a very gratifying one, if regarded in its true light, namely, as a palliative not curative effect. As Mr. Southam states, it did not “prevent a fatal issue.”

On the other hand, instances are recorded in which the hot-air bath caused distress. Thus in a case published by Dr. Southey (*Medical Press and Circular*, 1887, p. 72) the bath was administered on the evening of the first day of the spasm; “he now had a vapour bath, during which he complained greatly of the heat, and he perspired freely.” The next day “he absolutely refused the vapour bath.” This patient, being a genuine case, of course died.

If an efficient palliative, the hot-air bath would be an adjunct to a sedative course of treatment; for in Mr. Southam's case it clearly exhausted the nerve centres, so that they no longer painfully reacted to reflex stimulation. The exact counterpart of this exhausting effect we have seen in the rabbit similarly treated. The consideration of this point suggests that this is the time to ask yourselves upon what definite plan we ought to treat this disease. Are we to go on attempting to cure it by experimenting upon human beings with substances like curare, or, as suggested by the antivivisectionists, with the hot-air bath; or shall we adopt what seems to me to be the only justifiable course, namely, assuage with all the narcotics at our disposal the sufferings of the patient, until we shall have found out the real antidote by experiment upon the lower animals, especially upon that one (the rabbit) in which the disease takes its painless form, paralysis, a form of which that remarkable veterinarian, Mr. Youatt, said with prophetic force thirty-seven years ago: "I very much regret that I never instituted a course of experiments on the production and treatment of rabies in this animal. It would have been attended with little expense or danger, and some important discoveries might have been made" (*The Dog*, by William Youatt, 1851). Surely the public, at any rate, who place themselves in our hands, under these the worst of circumstances, would unhesitatingly choose to be helped to die painlessly. And in following such a course no practitioner would be violating, by neglect, the great ethical principle of his profession, that he should endeavour, as far as lies in his power, to preserve life as well as alleviate pain. For there is no single case of reputed cure of developed hydrophobia by drugs or other means that will bear close investigation. Neither has anyone succeeded in arresting by these methods the march of the symptoms when once distinct in an experimental animal, although an enormous series of drugs have been tried, notably by Mr. Dowdeswell (*Proceedings of the Royal Society*). Nor have workers in this direction been able, by the use of drugs, to imitate in the slightest the protection

afforded by M. Pasteur's system of inoculation. Of the ability of that system to overtake and check the development of disease, if applied within a reasonable time after inoculation, and under the ordinary circumstances, there is no longer any doubt, but it is powerless against the developed symptoms. There remains for us, therefore, the determination of our action in those cases where M. Pasteur's system has failed, or where it has not been applied. I hope I have shown sufficient reason that that action should, in the present state of knowledge, be simply palliative (by the employment of the most powerful narcotic drugs), and that all tentative treatment by drugs or the hot-air bath, being quite powerless to cure, and, consequently, cruel, should be abandoned.